Storm Control Broadcast Multicast Unicast - Carrier Ethernet Technical Standard Compliance Register

CARRIER ETHERNET TECHNICAL STANDARD COMPLIANCE REGISTER: STORM CONTROL (BROADCAST, MULTICAST, UNICAST)

## 1. PRODUCT IDENTIFICATION & REGULATORY SCOPE

This document serves as the official Technical Standard Compliance Register for the implementation of Storm Control for Broadcast, Multicast, and Unicast traffic across the Carrier Ethernet portfolio. This register defines the hardware-level traffic policing mechanisms, forwarding plane behaviors, and conformance to IEEE 802.1Q, ITU-T Y.1731, and MEF 10.4 Service Level Specification standards.



## 2. CORE INTERNAL TOPOLOGY & FORWARDING ENGINE ARCHITECTURE

The Storm Control subsystem is integrated directly into the forwarding ASIC pipeline, operating in parallel with the classification and policing engines. Three discrete metering modules are provisioned per physical port:

- Broadcast Suppression Engine (BSE): Dedicated to Layer 2 broadcast destination MAC (FF:FF:FF:FF:FF:FF)

- Multicast Suppression Engine (MSE): Filters traffic addressed to configurable IPv4 multicast groups (224.0.0.0/4) and IPv6 multicast (FF00::/8)

- Unicast Suppression Engine (USE): Polices destination-specific unknown unicast flooding triggered by an empty or unresolved MAC address table.

3. SWITCHING SUBSYSTEM CAPABILITIES

Each suppression engine operates independently with a 1ms metering bucket refresh cycle. Key capabilities include:

- Granularity: 0.01% to 100% of line rate in steps of 0.01%, or absolute rate (1 kbps to 100 Gbps)

- Burst control: Configurable burst-size tolerance up to 64 MB per port

- Action set: Drop, Trap (to CPU for logging), or Shutdown port

- Scope: Per-port, per-VLAN, or per-interface queue

OPERATIONAL ADVANTAGES

- Deterministic latency: Storm control bypasses CPU, operating strictly in hardware with < 100ns decision latency

- Non-blocking: Concurrent operation on all 48 x 1G/10G ports + 4 x 40G/100G uplinks

- Tail-safe: Policing applied at ingress port immediately after physical layer decoding

SPECIFICATION MATRIX

| **Parameter** | **Specification** |
|---|---|
| Form Factor | 1RU Standard / 19-inch rack mountable |
| Switching Capacity | Non-blocking 1.28 Tbps (full duplex) |
| Forwarding Rate | 952 Mpps (64-byte packets) |
| Storm Control Granularity | 0.01% to 100% line rate, step 0.01% or absolute 1 kbps - 100 Gbps |
| Burst Tolerance | Configurable up to 64 MB per port |
| Latency (Policing Decision) | < 100 nanoseconds (hardware ASIC) |
| Concurrent Ports Supported | 52 (48 x 1G/10G + 4 x 40G/100G) no performance degradation |
| Power Supply | Dual Hot-Swappable Redundant AC (100-240V, 50/60Hz) or DC (-48V) |
| Max Power Consumption | 95W (full load with storm control active) |

| | |
|---|---|
| MTBF (Storm Control Subsystem) | 3,450,000 hours |

REGULATORY COMPLIANCE

IEEE 802.1Q-2022 (Clause 8.6.3) – Traffic classification and metering

ITU-T G.8032 (Ring protection compatibility) – Storm control interworking with ERPS

MEF 10.4 – Bandwidth profile for ENNI and UNI subscriber flows

RoHS 3 (EU 2015/863) – Hazardous substance compliance for all hardware components

CE, FCC Part 15 Class A, VCCI-CISPR 32




LIFECYCLE ASSURANCE (MTBF)

Hardware-based Storm Control engines operate without moving parts or software intervention. Calculated MTBF for the Storm Control subsystem: 3,450,000 hours (field-proven). Redundant power and cooling ensure continuous policing at 100% line rate.

TARGET BACKBONE TOPOLOGIES

- Carrier Ethernet aggregation rings (Metro E)
- Data center leaf-spine (uncontrolled unknown unicast suppression)
- Campus broadcast domain segmentation (VoIP + video storm immunity)